

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

REC'D 17 MAR 2005

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Applicant's or agent's file reference P 02 119 WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/DK 02/00831	International filing date (day/month/year) 09.12.2002	Priority date (day/month/year) 09.12.2002
International Patent Classification (IPC) or both national classification and IPC H03G5/00		
Applicant TC ELECTRONIC AS et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17.06.2004	Date of completion of this report 16.03.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Hartberger, J Telephone No. +49 89 2399-2193



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/DK 02/00831

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-28 as originally filed

Claims, Numbers

1-23 received on 17.12.2004 with letter of 15.12.2004

Drawings, Sheets

1/6-6/6 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form. :
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☒ the claims, Nos.: 24-26
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-23
	No: Claims	
Inventive step (IS)	Yes: Claims	1-23
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-23
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: US-A-6 163 789

D2 : US-A-4 891 841

2. Document D1, which is considered to represent the most relevant state of the art, discloses (cf. Figs. 3, 5, and 6, and the description column 1, lines 16-49, column 2, lines 18-48 and column 3, lines 10, to column 4, line 48) an parametric equalizer from which the subject-matter of Claim 1 differs in that said parametric equalizer comprising further means for adjusting a symmetry parameter independent to the other user parameter, which may be continuously varied in order to provide a smooth transition between "low-shelf", "bell-shaped" and "high-shelf" filter characteristic of said at least one filter block (FIB).

The subject-matter of Claim 1 is therefore new (Article 33(2) PCT).

3. The problem to be solved by the present invention may be regarded as to obtain a user friendly way of adjusting a parametric equalizer, in particular by adjusting a further parameter which may be continuously varied independent from the other three parameters to provide a smooth transition between different filter characteristics of the at least one filter block.

The solution to this problem proposed in Claim 1 of the present application is not rendered obvious from the available prior art, in particular from D1 or D2 alone, or in combination of this two documents.

The subject-matter of Claim 1 is thus considered as involving an inventive step (Article 33(3) PCT).

4. Claims 2 to 23 are dependent on Claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
5. The industrial applicability of the subject-matter as claimed is not doubted.

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6. For the sake of completeness the following is noted:
- The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT;
 - Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.
 - Furthermore, taking into account the bell shaped filter responses in Figures 2d-3b it appears that f_c in these cases should be understood to mean the center frequency rather than the corner frequency, which is presently not defined in the claims (Art. 6 PCT)

Amended Claims (15 December 2004)

1. Parametric equalizer comprising
filtering means (FM), user interface means (UIM), audio signal input means and
5 audio signal output means,

said filtering means comprising at least one filter block (FIB)

10 said user interface means (UIM) comprising means for adjustment of first, second
and third independent user parameters: corner frequency (fc), shape (Q) and gain
(G),

15 said parametric equalizer comprising further means for adjusting a symmetry
parameter independent to the other user parameters, which may be continuously
varied in order to provide a smooth transition between low-shelf, bell-shaped and
high-shelf filter characteristic of said at least one filter block (FIB).

2. Parametric equalizer according to claim 1, wherein

20 said user interface means (UIM) comprises a further symmetry adjustment parameter
(SYM) for establishing a variable symmetry of the magnitude response of said at
least one filter block (FIB),

25 said user interface means is mapped by means of coefficient adjustment algorithms
into filter coefficient settings (FCS) of the at least one filter block (FIB), which when
established reflects the adjustment of the user interface means (UIM)

30 said further adjustment parameter (SYM) provides a filter coefficient setting (FCS)
comprising a combined adjustment of at least one zero frequency, pole frequency,
zero Q and pole Q of the magnitude response of said at least one filter block.

3. Parametric equalizer according to claim 1 or 2, wherein

5 said user control means facilitates adjustment of corner frequency (fc), Shape (Q), gain and symmetry.

4. Parametric equalizer according to any of claims 1-3, wherein said filter coefficient settings (FCS) comprise digital coefficients.

10 5. Parametric equalizer according to any of the claims 1-4, wherein said filter coefficient settings (FCS) comprise analogue values established by means of adjustable or selectable filter components of said at least one filtering means.

15 6. Parametric equalizer according to any of the claims 1-5, wherein said filtering means comprises less than twenty individually adjustable filter blocks (FIB), preferably less than ten and most preferably less than six.

7. Parametric equalizer according to any of the claims 1-6, wherein at least one of said filtering blocks comprise a biquatic filter.

20 8. Parametric equalizer according to any of the claims 1-7, wherein said parametric equalizer comprises at least one, preferably at least three cascaded biquadratic filters blocks (FIB) .

25 9. Parametric equalizer according to any of the claims 1-8, wherein said filtering means is analogously implemented.

10. Parametric equalizer according to any of the claims 1-9, wherein said filtering means is digitally implemented.

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11. Parametric equalizer according to any of the claims 1-10, wherein said filtering means comprises gain compensation means adapted for compensation of alteration of the filtering block gain invoked by a changed setting of the further adjustment parameter.

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12. Parametric equalizer according to any of the claims 1-11, wherein said filtering means comprises corner frequency compensation means adapted for compensation of alteration of the corner frequency of the filtering block invoked by a changed setting of the further adjustment parameter.

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13. Parametric equalizer according to any of the claims 1-12, wherein said user interface provides at least four different asymmetries of filter setting at least in part of the frequency range.

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14. Parametric equalizer according to any of the claims 1-13, wherein said further adjustment parameter (SYM) enables the user to gradually transform the filter block (FIB) between a low-shelf and a high-shelf filter characteristic.

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15. Parametric equalizer according to any of the claims 1-13, wherein said further adjustment parameter (SYM) enables the user to gradually transform the filter block (FIB) from a low-shelf into a bell-shape and further into a high-shelf, thus defining at least one more than said three standard filter types.

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16. Parametric equalizer according to any of the claims 1-15, wherein the number of said adjustment parameters corresponds the number of non-trivial degrees of freedom of the at least one filter block (FIB).

17. Parametric equalizer according to any of the claims 1-16, wherein the number of said adjustment parameters is at least the number of non-trivial degrees of freedom of

the at least biquad filter block (FIB) times the number of filter blocks (FIB) of said filtering means.

18. Parametric equalizer according to any of the claims 1-17, wherein the number of non-trivial degrees of freedom of each of a number of cascaded filter block is at least four.

19. Parametric equalizer according to any of the claims 1-18, wherein the symmetry parameter may be set by means of the user interface to at least four different values, preferably a continuous interval of values in the digital or analog embodiment.

20. Parametric equalizer according to any of the claims 1-19, wherein the adjustment parameters are converted into filter coefficient settings (FCS) triggered by the setting of the adjustment parameters by the user.

21. Parametric equalizer according to any of the claims 1-20, wherein the conversion of adjustment parameters into filter coefficient settings is invertible.

22. Parametric equalizer according to any of the claims 1-21, wherein $NDOF_{par} \geq NDOF_{coef}$,

where $NDOF_{par}$ is the number of adjustable equalizer parameters and $NDOF_{coef}$ is the number of non-trivial degrees of freedom (fc, G, Q, Sym).

23. Parametric equalizer according to any of the claims 1-22, wherein given filter coefficient settings may be converted into corresponding adjustment parameters.